

# *Understanding Battery Energy Storage Systems – Current and Future*

BESS Presentation to ERCOT Technology and Security Committee

February 9, 2026



**Texas Solar + Storage  
Association**

# INDUSTRY SNAPSHOT

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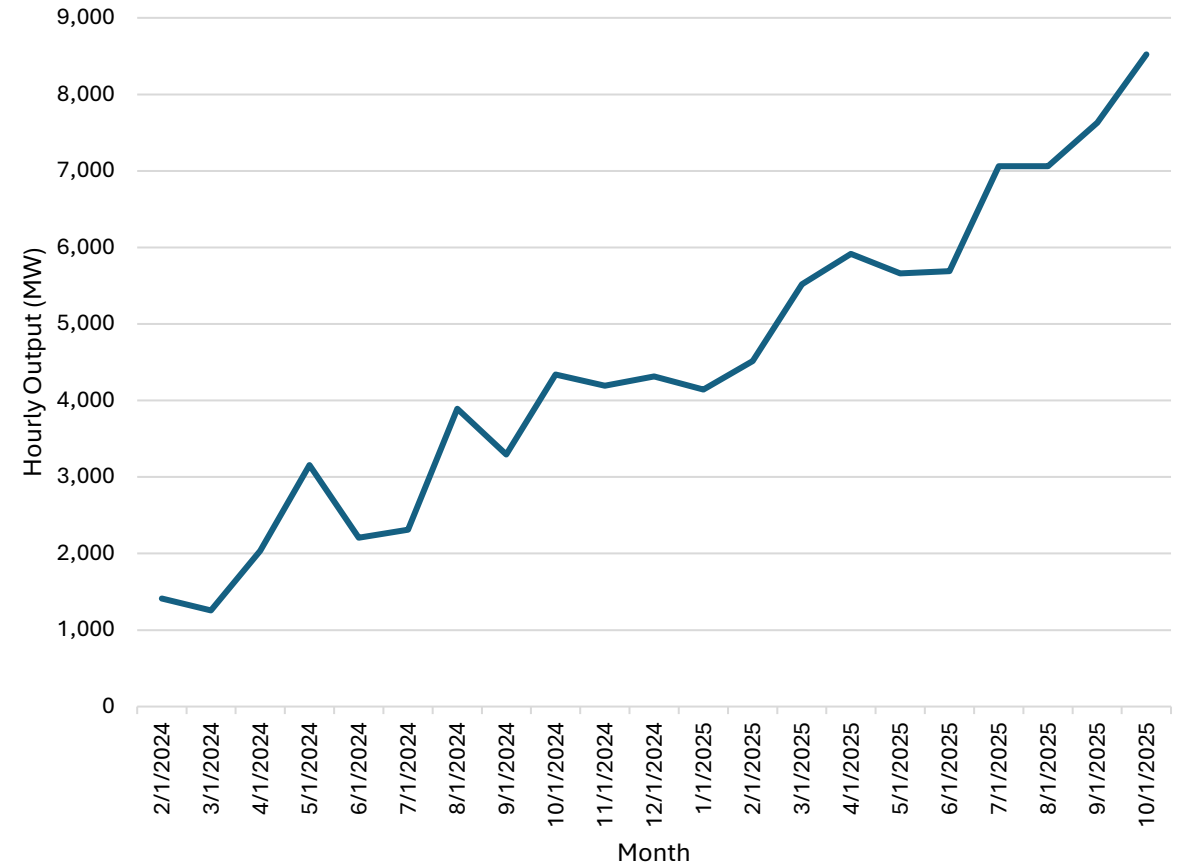
- Installed and operating BESS capacity: 15,712 MW.
- Texas BESS now #1 in USA.
- Neck and neck with solar growth -- fastest growing resources on the grid.
- Over 6,000 MW added to the grid in the past year.
- #1 in ERCOT project development queue.
- BESS at times powers 10% of Texas.
- BESS is increasing grid reliability and aiding in power price and ancillary services affordability.
- Evolution of BESS: 1-hour, 2-hours, 4+ starting to enter the market.
- Scalable, flexible, fast-responding, deployable throughout all of Texas. 30% of BESS co-located with solar.
- 89<sup>th</sup> Legislature adopted legislation (HB 3809/HB 3824) decommissioning and fire safety legislation to better protect Texas communities and ensure responsible growth of BESS.



# Current State of BESS in ERCOT

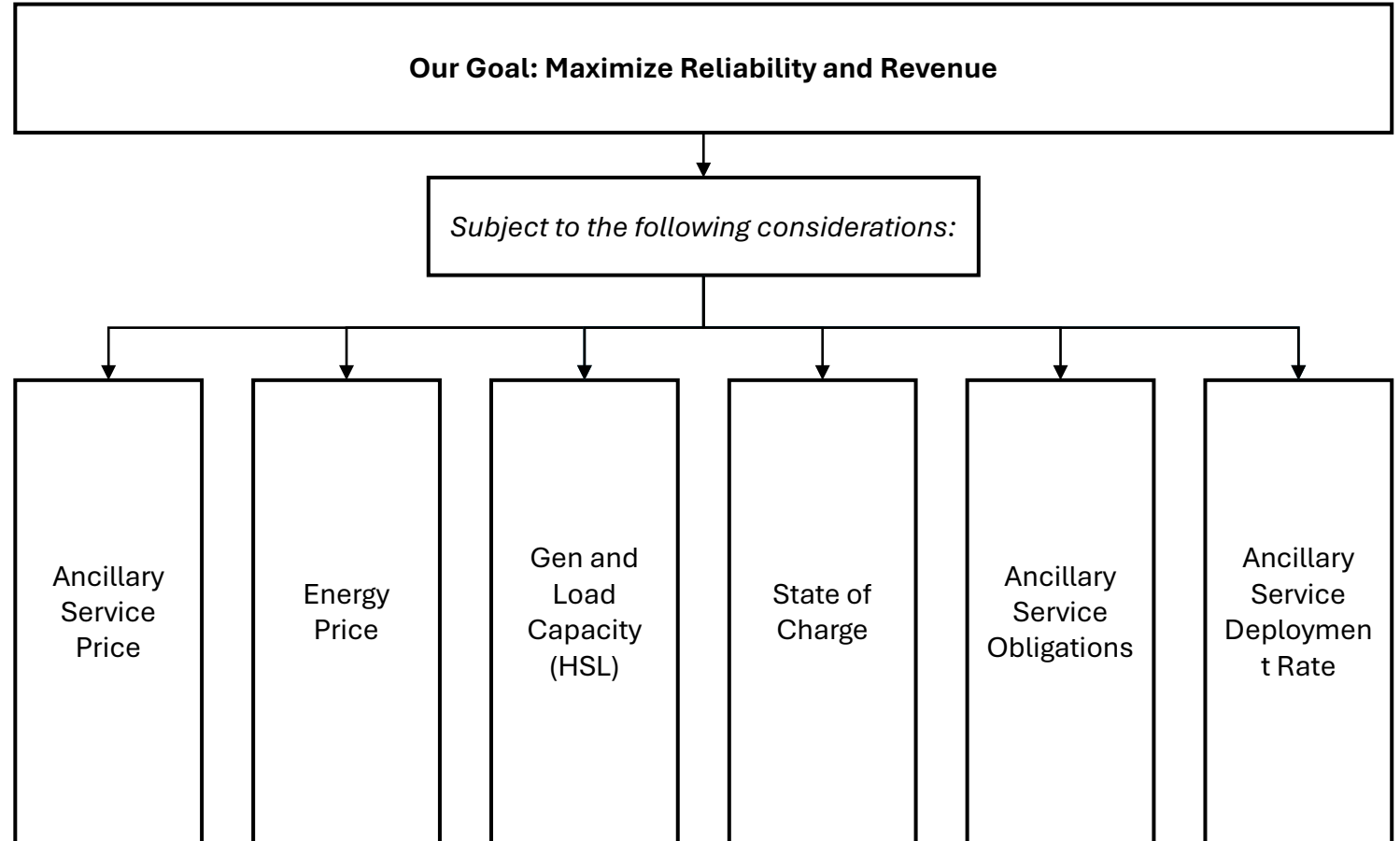
- BESS provides essential MWs when the system is most strained
  - BESS output hit an all-time record of over 8 GW in October 2025
  - Providing MWs in the peak hour of the day lowers energy costs for consumers
- Increased reliability
  - Early BESS players participated mostly in ancillary services.
  - As supply and reliability increased in the AS market, BESS participation increased in energy market
  - **Net Result:** BESS participation in the ancillary service market has dramatically reduced costs for consumers. *The price of reliability has decreased.*

Maximum BESS Output by Month (MW)



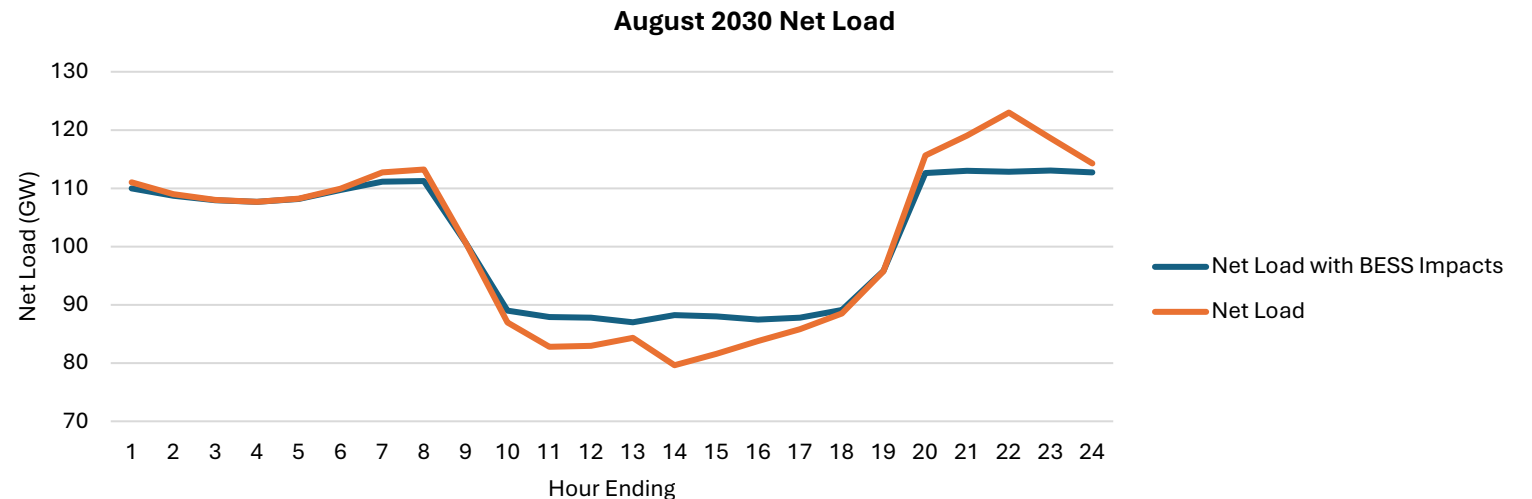
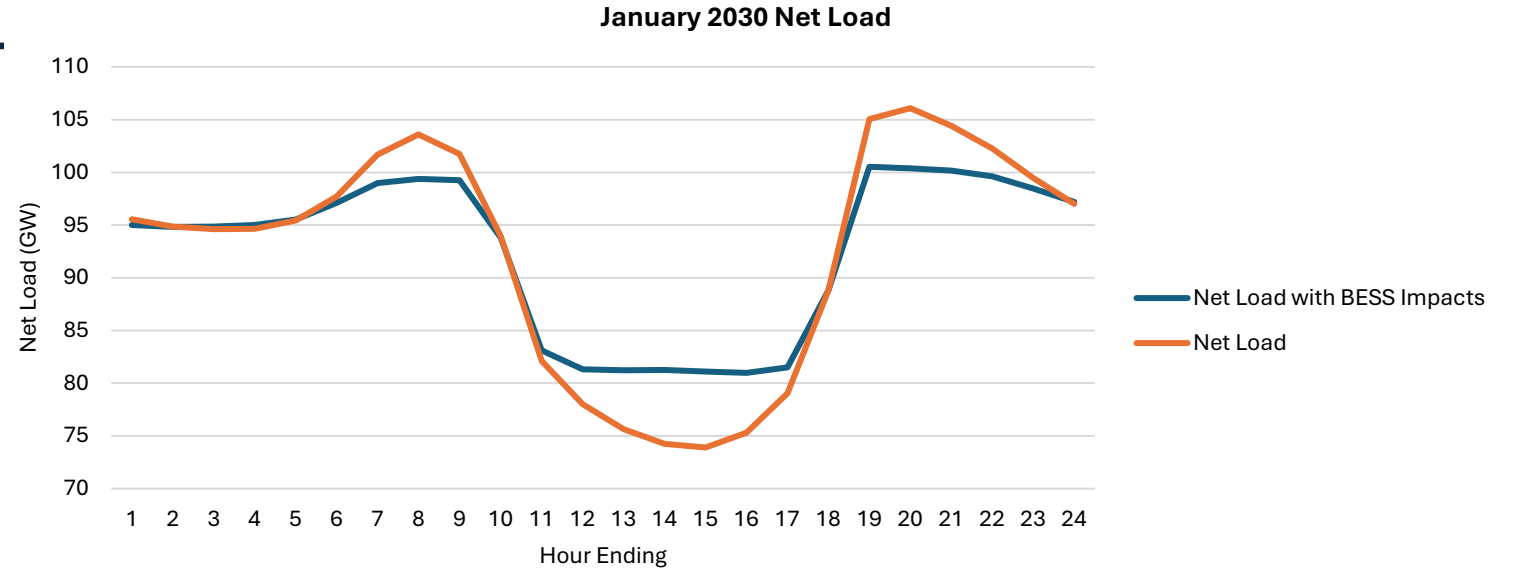
# Engie Experience in BESS in ERCOT

- **3.2 GW / 4.7 GWh** of storage currently being optimized **every 5 minutes** through Engie software
  - In any minute, we could discharge enough power to **power 3,200,000 homes**
- Engie batteries have been operating for **5 years**
- Engie balances generation and load portfolios with batteries to manage risk and reliably serve customers
  - The model is well suited for **data centers**
- Easy to install BESS close to load centers due to land footprint



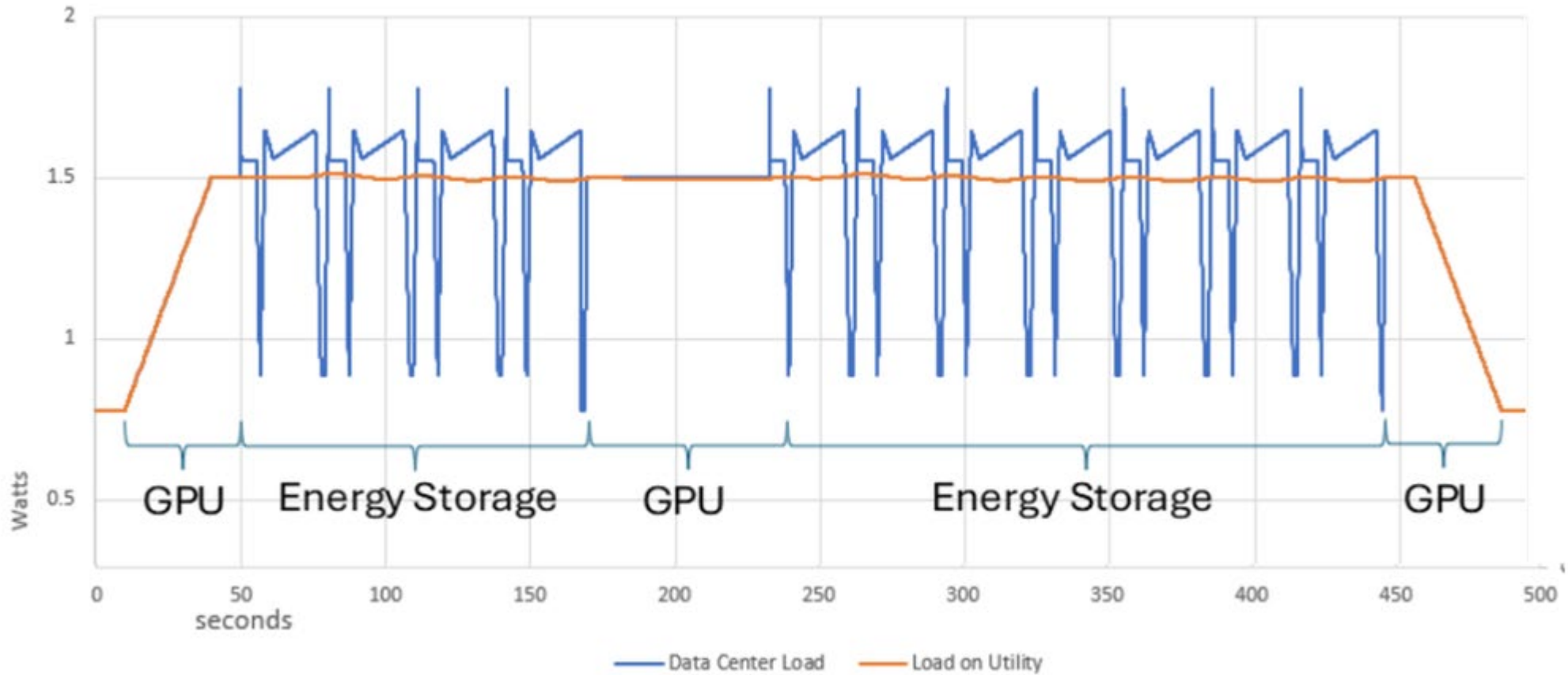
# State of Affairs in 2030

- Load growth will challenge the ERCOT system
- Batteries will flatten out the net load peaks of the day
- BESS developers may choose to increase the duration of their assets to meet the flatter load peaks
- Variability of renewable resources necessitates the flexibility that BESS provides



# BESS and Data Centers

Data centers need BESS to manage volatile usage patterns



Training run with GPU-level smoothing and Energy storage together delivering a clean load to utility

# Engie RTC+B Takeaways

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- Real time dispatch of ancillary services allows for more efficient dispatch of storage assets across the grid
- Non-spin duration requirements are creating a price premium on the product that did not exist previously. Batteries can help in the same manner they did pre-RTC+B.
  - More thermal generation will be needed to provide NSPIN and potentially remove the generation from the energy market
- State of charge compliance is simpler than pre-RTC because the asset's current SOC is included in the ERCOT dispatch algorithm

# Technology Update on Long Duration vs Short Duration

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- **Short duration originally built to be flexible**
  - ERCOT's problem in the early 2020s was short, violent price spikes. Batteries could respond to these 20 minute price spikes
  - Most BESS are current built using LFP technology
- **Short duration BESS are still under utilized**
  - A battery's ability to provide reactive power supports the following issues:
    - Voltage ride through
    - Transmission constraints and stability
    - Black start
- **Long duration technologies are improving; there is not a clear market incentive nor signal to build**
  - Long duration is more costly than short duration assets
  - However, technology improvements are beginning to lower the cost
    - Zinc BESS

## The ERCOT market construct and pricing signals suggest 1-3 hour BESS build

- **The economic price signal suggest resources should be designed to meet net-load ramps**
  - Solar drop-off in evening peak (2–4 hrs)
  - Secondary winter morning ramp (1–3 hrs)
- **ERCOT needs fast responding resources to manage frequency and inertia**
  - Generator trips + hyperscale / crypto load trips
  - Only BESS provides millisecond response
  - Duration adds no incremental value
- **ERCOT lacks a duration-valuing market construct**
  - No capacity market
  - No multi-hour reliability reserve (before DRRS)
  - Energy prices alone cannot support LDES capital recovery

## What changes would incentivize LDES?

- **A capacity market that values deliverability across a large swath of the day**
  - Create a mechanism where load needs to procure capacity to match their load profile
- **An energy market that sees large swings in daily prices rather than hourly prices**
  - This may occur where there are large diurnal wind patterns or large swings in natural gas prices
- **Lower CapEx for long duration storage**
  - Batteries have not achieved the economics of scale necessary to make costs significantly lower as duration is added to an asset